

HR-226 Iowa Research With Chem-Crete Bitumen

Key Words: Chem-Crete, Asphalt, Mix design,

ABSTRACT

There are areas within the state of Iowa which do not have Class I aggregate readily available for asphalt cement concrete (ACC) road construction. For this reason, a product is needed to better utilize the local aggregates for road construction and maintenance.

There is a product on the market which the promoters claim will improve the present asphalt to such a degree as to "upgrade deficient aggregates" to the level they can be used in today's standard construction techniques. This product is "Chem-Crete Bitumen" that was promoted by Chem-Crete Corporation of Menlo Park, California. Chemcrete Technologies, Inc. of Wickliffe, Ohio; a wholly owned subsidiary of the Lubrizol Corporation has since purchased the U.S. patents of Chem-Crete. Chem-Crete was promoted as a product which increases the stability of asphalt mixes at all temperatures, improves durability and upgrades the fatigue response of present materials by increasing the limiting stress and strain.

Objective

The primary objective of the research was to determine if ChemCrete Bitumen would provide significantly improved performance of the mix designs used. The secondary objective was to determine if a satisfactory asphalt concrete base could be made using a poorly graded sand.

Two roadways were selected in Story County to evaluate the performance of Chem-Crete Bitumen. A crack survey was completed during the first two weeks of March 1981 on the two Chem-Crete projects. The Chem-Crete sections exhibited severe cracking while the control sections did not. Cracks in the Chem-Crete sections were as wide as 3/4 of an inch. The Chem-Crete Corporation testing indicated that the primary problem was inadequate tensile strength in the Chem-Crete sections.

The Iowa DOT Road Rater was used to determine the relative strengths of the test segments before and after construction. The 1982 testing indicated lower deflections for the comparative Chem-Crete sections. The severe cracking on the Chem-Crete sections required corrective action in 1982. North Dakota Street received a seal coat and the cracks on E-57 were sealed with emulsion in the summer of 1982. Chem-Crete Corporation funded the cost of the crack sealing and seal coating. A second seal coat was placed on North Dakota Street in 1983 to correct the earlier seal coat which had experienced loss of cover aggregate.

Conclusions

1. Based on the comparative test sections with and without the asphalt modifier, it can be concluded that Chem-Crete had a very detrimental effect on the Type B mix used. Severe cracking on the Chem-Crete section developed in the first year of service.

2. The asphalt concrete base mix using the Chem-Crete modifier and poorly graded sand was unsatisfactory. Severe cracking also developed in the first year of service.
3. The Chem-Crete sections will require substantial future maintenance. The seal coat applied to the North Dakota section will probably be inadequate and either overlay or removal will be required much earlier than normal. In January, 1984 the crack filling on E-57 appears to be inadequate and further work will be required.